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ABSTRACT

Perception has become an important term in recent literature on reading problems and their solutions. However, the relationship between perception and reading has not been clarified. Tests of visual perception often focus on skills such as copying geometric designs which have little or nothing to do with reading skills or readiness. Researchers have investigated the use of auditory analysis skills tests in predicting reading abilities. The purpose of these tests is to show whether the child is able to sort out and organize sounds in words. Data has indicated that the auditory analysis tests were a good predictor of reading skills in first-grade children. Since the development of perceptual skills occurs primarily in early childhood, different sociological backgrounds will provide different perceptual experiences for the preschool child. And because reading success is dependent on a child's familiarity with Standard English sounds, exposure to such sounds should be a part of early school training preparing the child to read. (AL)

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July 13, 1971

Perceptual Issues in Reading*

The word perception has arrived! If we were to use it as an item in a free association test, it undoubtedly would evoke a broad variety of responses, ranging from "hocum and mythology" to "trampoline--balance rail--the answer to reading problems." In truth, neither the hostile antagonist who mutters "unmitigated nonsense", nor the zealot who bows westward, toward the headquarters of Frostig and Kephart, is correct. There are pertinent, valid relationships between perception and reading. But, before we can discuss these relationships, we must come to some agreement on the meaning of the terms. It is, in fact, the lack of standard meaning for terms that has caused much of the diversity of opinions regarding this topic.

My first goal for this presentation, then, is to define perception in operational terms. If I succeed in this effort, I can share with you some of the results of our research in this area--research that focused on two basic questions: (1) What relationships, if any, do exist between perception and reading? and (2) Given that certain positive relationships do exist, so what?

A child enters the first grade. He has lived a sufficient number of years and can satisfy other standard criteria well enough to justify his presence in the classroom. Certain assumptions are immediately made. Given that he has normal sight, hearing, at least one hand, and the ability to produce understandable speech, it is assumed that he can receive reasonable complex visual information with his eyes and learn to produce such information with a writing tool in his hand. It is also accepted that he can receive reasonable complex acoustical information with his

RE 003 802

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ears and reproduce it with his vocal mechanism. These assumptions are generally valid--but not always.

There are two aspects to visual and acoustical information. The one--abstract; the other--concrete. We invariably focus our attention on the former. At the sophisticated adult stage, it is extremely difficult to consider visual and acoustical communications as anything but information, rather than an arrangement of sensations. In essence, however, that is what such communications are--an arrangement of sensations that, when ordered appropriately, function as a code for the transmission of written or spoken language. A printed word is, indeed, a word--a series of letters arranged in a specific sequence. It is, however, something less abstract as well. It is an arrangement of shapes that have achieved the status of a code in a particular culture. The adult doesn't "see" the word cat as an arrangement of three letters, let alone as a series of shapes that combine to construct the letters. He imposes structure on the sensations and "sees" a unit--a word. All of those underlying, more basic processes became virtually automatic and effortless much earlier in life. The same discussion is also appropriate to spoken language. A spoken word is not "heard" by the adult as a series of sounds; he imposes structure on the sensations and "hears" a word, even though it is, in fact, a sequential arrangement of acoustical events. The act of imposing structure--order--on raw sensory data is, in the context of this paper, an operational definition of perception.

It is generally accepted that the neonate lacks the perceptual skills assumed of the first-grade child. He must acquire them, and child

development studies have demonstrated that he does so on a relatively predictable schedule. As an illustration of this point, consider the characteristic test for visual-motor development. Although there are a number of visual discrimination tests available, the most commonly used tests ask the child to do more than discriminate; they ask him to copy graphic patterns--ordinarily, geometric designs. Gesell and others have shown that the child demonstrates the ability to copy increasingly complex designs as he matures; that his skills progress along a developmental continuum from global to differentiated. Thus, whereas at the age of four years, a child usually can copy a circle, a cross and perhaps a square, he cannot reproduce a triangle adequately. It follows, then, that an assessment of a child's visual-motor development may be made by examining his ability to copy a series of geometric designs that range from simple to complex.

What do inadequate copying skills imply? For example, even though the average six-year-old can copy an asterisk constructed of four lines (vertical, horizontal and two opposing diagonals), some produce a substandard product. Is their sight poor? Perhaps, but this can be assessed objectively by a professional, and the data show that poor sight is rarely a related cause. Distorted vision? Do they literally "see" it that way? No--these same children will rarely reveal similar difficulty in a discrimination task where one is asked to point to a matching design shown in an array of similar but not matching ones. It appears that the child whose reproductions of geometric designs are global representations rather than precise replications of the patterns is saying,

in effect, that there are too many details; that he is inefficient in sorting out the lines of the patterns as individual elements and plotting the spatial interrelationships of those elements.

Relate this to the copying of a diamond. The child must not only be aware of four lines; that awareness could describe a number of other polygons, including the square. He also must be able to view the pattern of lines as though seen on a map of spatial coordinates. By viewing the design as a series of interrelated lines, and by learning how to infer a spatial coordinate map onto that design and onto the space wherein he will place his reproduction, the child will have acquired the skills necessary to copy reasonably complex designs. More importantly, he will have acquired skills that are generalizable to a wide variety of situations where the ability to analyze--sort and order--the visual sensations is crucial to abstracting the information conveyed by these sensations.

What has all this to do with learning to read? Do visual perceptual skills seem to influence a child's reading performance? Do good copying skills predict good reading and vice versa? No!--at least not to any important degree. Granted, in order to read the child must discriminate efficiently the letters of the alphabet. Our data show, however, that this does not require 6 year old visual-motor skills. A child need not be competent in copying a diamond, or--for that matter--a triangle, before he can be expected to recognize the lower case manuscript letters of the pre-primer. Thus far, our research indicates that visual perceptual skills, as assessed by copying tests, accounts for only about ten percent

(r = .32) of the variance in reading among primary grade children. Although one can find instances of statistical significance, it cannot be considered to be of major consequence in any practical sense. We do have evidence of a much closer relationship between visual perception and arithmetic--but not with reading.

Consider now auditory perceptual skills--the ability to impose structure on acoustical sensations. The characteristic tests for auditory perception are, unfortunately, discrimination tests. These do not ask for a reproduction of sequenced sounds from the child and, as such, are less than optimal. Last year we started to investigate a set of behaviors that seemed to probe auditory perceptual skills in a way that was analogous to the visual-motor copying tests. The examiner states a word; the child repeats the word. The examiner then asks the child to repeat the same word again, but to omit a portion of it in the second effort. The portion to be omitted varies from a single syllable of a two-syllable compound word (e.g. "cowboy" - "say it without cow") to a single consonant sound from the beginning or end of a one-syllable word (e.g. "cat" without /k/; "meat" without /t/), to a single consonant sound that is part of a consonant blend (e.g. "stream" without /r/).

In developing this test of auditory analysis skills (AAT), we found a broad range of individual differences among children from the age of 6 years and up. Why? Poor hearing? Perhaps, but again, this can be assessed by a professional. Distorted hearing? Does he literally hear it that way? Our data on discrimination tests rule that out. As was

stated in the discussion concerning visual perception, it appears that the child whose AAT responses were inappropriately global is saying, in effect, that the stimulus contains too many details and that he lacks competency in sorting out the individual elements--the sounds--and ordering them in a correct sequence.

What's involved in the task "say take without the /t/ sound"? To perform this behavior successfully, the child must understand that words are constructed of a series of sounds--acoustical events that occur in a precise sequence--and that it is possible to manipulate that arrangement of events. He must be able to sort those sounds and understand their order. The visual-spatial coordinate map, so useful in plotting graphic patterns, does not apply to analysis of sounds. A different map must be used. Spoken sounds occur over time; they are temporal events. Hence, the child must have access to a map that is effective in ordering time. Rhythm is one such device.

Again, after testing a number of children in their ability to analyze the sounds in spoken words, we asked the same question. What has this to do with learning to read? Do such auditory perceptual skills seem to be related to reading performance? Do good "listening" skills, as measured by the AAT, predict good reading and vice versa? Yes--they do indeed appear to be strongly and positively interrelated. Our data, now based on the outcome of testing over 1000 children in various schools, show that auditory perceptual skills, as defined by the AAT, accounted for anywhere from 30 percent ($r = .54$) to 70 percent ($r = .84$) of the variance

in reading among primary grade children. Not only are these statistically significant, they are data that signal to us very important interrelated functions--functions for which cause and effect studies must be undertaken.

Two such studies were conducted this past year. In both cases, two questions were asked. Can the behaviors being assessed by the AAT be taught to first-grade children and, if so, what will the effect of such training have on the child's reading. The outcomes supplied very strong support to the first hypothesis. Yes, the behaviors can be taught. Even more important to us was the answer to the second question. Here, too, we found very strong support for the hypothesis that improvement of auditory perceptual skills through training is generalized to improved reading performance.

So what? It supports an argument for instructional programs that teach young children to listen to spoken language in a precise, analytical fashion. The only successful approach we have found to accomplish such a goal has been to include a training component that teaches the children to speak more precisely. In speaking precisely, the child engages in active exploration of the individual sounds and their sequence. He learns to analyze spoken words, a vital pretraining to the discrete synthesis of phonic arrangements.

I referred previously to the developmental continuum of global to discrete that is representative of all developed functions. Yet another principle is evident in a typical developmental pattern. Sensory-motor functions not only become more differentiated with growth and development; they also evidence a shift in emphasis insofar as to which component of

the hyphenated term (i.e. sensory-motor) contributes most to the child's visual and auditory processes. The two-year-old organizes better what he sees if he can explore it physically. The overt motor involvement of manual exploration provides the visual mechanism with tangible information that stimulates more discrete analytical visual processes. These, in turn, enable the eyes to direct the hand more precisely, and so on. Simultaneously, the hands are becoming more precisely articulated. The effect of this closely interrelated feedback loop arrangement between hand and eye is that eventually the eyes see as though the hands were exploring. The motor involvement has been transformed from overt to covert, thus yielding more rapid visual processing over much vaster territories.

In analogous fashion, the four-year-old evidences more articulate vocomotor skills that he did when he was three. He produces overt sounds, monitors those auditorially and compares them to the other sounds occurring in his environment. Through this cyclical interaction of hearing others, producing and hearing his own speech, modifying his speech production processes to approximate that which he has chosen to imitate and so on, his vocal mechanism, in effect, provides for his ears what his hands provided for his eyes. That is, it allows him to explore sound, to acquire some tangible information about the sensations that are received by his ears, through overt motor involvement that is ultimately replaced by covert behaviors.

Ideally, normal growth and development patterns enable the 6-year-old child to process visual sensations of moderate complexity without resorting to the inefficient behavior of manual exploration; he does not have to touch

all that he sees in order to translate it. It also enables him to process acoustical sensations of moderate complexity without evidencing the inefficient behavior of vocomotor exploration; he does not have to repeat all that he hears in order to translate it. Given conditions that require him to use these motor functions, maturation schedules suggest that these overt behaviors will be relatively precise; hence, they will be supportive.

Proficient perceptual skills, therefore, appear to be a product of development--of both nature and nurture. The infant fortunate enough to have been born with an intact biological system and into a conducive environment is more likely to display appropriate perceptual functions, when he enters school, than is his peer whose background was less ideal. The important point is that at this time no single cause for atypical perceptual development has been identified. Certainly, there are many instances where central nervous system insult appears to be directly related; but there are at least as many other instances where the child's neurological system (and other biological processes) appears to be completely intact. Hence, we must stop thinking of perceptual dysfunction as a medical problem; rather, it must be viewed as an educational problem that is directly related to a child's ability to acquire the coding and decoding skills that are assumed by the reading and arithmetic curricula of the classroom.

For example, what of the child whose pre-school years were spent in an acoustical environment that was not highly differentiated, insofar as phonic stimuli are concerned? It is predictable that (1) his own speech patterns will indicate a substandard sensitivity to the discrete

phonic relationships of the spoken language and (2) his listening skills will reflect similar global characteristics.

Learning to read, regardless of instructional method, requires that the child develop an awareness of letter-sound relationships. Some reading programs spend more time teaching the rules of those relationships, others provide experiences and expect the child to generate the rules on his own. Most children encounter little difficulty in comprehending that there are three letters in the word "cat". Many children display appreciably more confusion in grasping the fact that there are also three sounds in the word "cat". Yet, in some way, they must appreciate that fact if they are to be able to generalize rules for reading beyond a very limited sight vocabulary level. They must learn quickly, for example, that the initial sound in "cat" can be substituted by another discrete sound, as indeed can either of the other two sounds that combine to form the word.

For the child whose pre-school years were spent in an environment that did not stimulate nor stress awareness of the precise sequencing and articulation of sounds in spoken words, the problem is obvious. The child is expected to learn a rather elaborate sight-sound coding system. To complicate matters even further, he is expected to learn it at a predetermined rate that is not reasonable, given his entering level of unfamiliarity with the stimuli that he will be asked to discriminate, reproduce and relate. The detrimental effects on whatever motivation may initially have been present are readily predictable.

In light of what has been stated, it seems reasonable to suggest that the dialect, the speech patterns, of the black child who has been raised in impoverished, isolated communities is pertinent to this discussion. I have tried to make the point that the speech patterns of an individual tend to predict the level of differentiation of his auditory processes. The inference is that the black ghetto dialect(s) tend to blur speech. Hence, they are detrimental to the acquisition of the skills that seem to be vital to adequate academic achievement. Ideally, the child should be made familiar with the forty-odd sounds of spoken English and some of the more common sequences very early in his school career. To allow him to be acquainted only with those sounds that are represented in his dialect and then expose him to the task of learning to read, wherein familiarity with most--if not all--of the sounds is assumed, is not only illogical; it is also cruel. If we can accept this position, it is our duty to sensitize education to the important function of articulate spoken language.

I appreciate that there are sociological as well as other factors also involved here. It is not my intent to advocate the institution of punitive measures--physical or psychological--against the child whose speech conforms to a dialect. I am not suggesting that we deny the child his dialect. My proposal is positive rather than negative. I agree, one can perhaps argue that the most humane approach is to reinforce the dialect rather than attempt to alter it. This may be benevolent from one viewpoint but, in a country where upward social movement tends to be related directly to education status, failure to provide the child with appropriate support in achieving academic status is not benevolent--it is devastating, whatever the averred justification.